March 18, 2013

Salutations to ECE 2300 students,

First, Exam 1 has been graded, and will be returned in class today.

Second, there are some issues in the grading that were common enough to merit some comments. First, and most important, many of you will find the question, “How do you know that these are equal?” written on your Problem 2 solution, with arrows pointing to variables on one of your circuit diagrams. This is a request for more explanation, but no credit was deducted for this issue on anyone’s exam. Please allow me to explain.

When multiple versions of the same device are placed in a circuit, there is an important issue that arises, that previous students often had difficulty with. The device often has a voltage or current variable defined as a part of the equivalent circuit for that device. In fact, when there is a dependent source present in the equivalent circuit (which is very common), there must be such a variable defined. However, when multiple versions of the device are placed in a circuit, the value of that variable might be different for each device. This is the rule rather than the exception. Thus, when drawing the circuit diagram, each variable should be given a unique name. You will see that I did that in my solution for this problem. If you do not, you are implicitly stating that each variable is equal in value to the variable for the other devices. The unique name is often simply the original name with a different number added to the subscript.

On Problem 2 in the exam, the voltages and currents for the two versions of the device did actually have the same values. This is because the currents for the two devices were the same, and the devices were in the same polarity. By “in the same polarity” here, I mean that the current that entered terminal A of one device, also entered terminal A of the other device. Thus, if you had labeled *vD* for each device in this problem this would be acceptable, because the values for *vD* in the two devices were in fact equal. It is reasonable that you may have recognized this, and therefore, I did not deduct any points for doing this. However, only one student actually explained why they did this. So, I wrote the question above, to draw attention to the assumption that you made. Remember that in other problems, doing this could be an error.

Also on Problem 2, a significant number of people wrote something like

*iA* when they meant to write *iA* = -3[A]. That is, their minus signs were over the equal signs. Do not do this. Other students wrote things such as *iA* +- *iB* = 0. This is poor notation. Use parentheses when you have consecutive signs, such as *iA* + (-*iB*) = 0.

Finally, on Problem 3, it is important to note that the order of operations in parallel and series combinations is not defined, and even left-to-right order of operations is not understood. Thus, when you have more than one operation in a line, and the order of operation is important, you must make this clear with parentheses. This is because

RA + (RB || RC)  (RA + RB) || RC. Thus, RA + RB || RC is not clear.

Thanks for reading this,

Dr. Dave